

AMENDMENTS TO THE CLAIMS

1. (currently amended) An apparatus for acquiring seismic data acquisition used in characterizing a subsurface formation, comprising:
 - a) a sensor unit coupled to an earth's surface for sensing seismic energy, the sensor unit sensing seismic energy imparted into the subsurface formation and providing a signal indicative of seismic energy reflected from the subsurface formation sensed by the sensor unit and suitable for imaging the subsurface formation;
 - b) an acquisition device co-located with the sensor unit and coupled thereto for receiving the signal;
 - c) a location sensor associated with the acquisition device providing a location parameter to only the acquisition device, the location parameter being correlated processed with the acquired seismic data;
 - d) a memory unit having a first memory disposed in the acquisition device for storing in digital form information indicative of the received signal;
 - e) a second memory for storing a location parameter associated with the sensor unit; and
 - f) a communication device for providing direct bi-directional communication between the acquisition device and a remotely-located central controller.
2. (previously amended) An apparatus according to claim 1, wherein the sensor unit, the location sensor and the acquisition device are co-located.
3. (original) An apparatus according to claim 1, wherein the sensor unit and the acquisition device are coupled together with a cable.
4. (original) An apparatus according to claim 1, wherein the sensor unit includes one of a velocity sensor and a pressure sensor.

5. (original) An apparatus according to claim 1, wherein the sensor unit includes an accelerometer.
6. (original) An apparatus according to claim 1, wherein the sensor unit further comprises a multi-component sensor.
7. (original) An apparatus according to claim 1, wherein the sensor unit further comprises a multi-component accelerometer having a digital output signal.
8. (original) An apparatus according to claim 1 further comprising an analog-to-digital converter disposed in the sensor unit, the signal provided by the sensor unit including a digital signal.
9. (original) An apparatus according to claim 1, wherein the signal is an analog signal, the apparatus further comprising an analog-to-digital converter disposed in the acquisition device for converting the signal to digital data.
10. (original) An apparatus according to claim 1, wherein the first memory further comprises a nonvolatile memory.
11. (original) An apparatus according to claim 1, wherein the first memory further comprises a removable memory.
12. (original) An apparatus according to claim 1, wherein the first memory further comprises one or more of a miniature hard disk drive and a nonvolatile removable memory card.
13. (original) An apparatus according to claim 1, wherein the memory unit includes

an inductive coupling device for transferring the information stored in the memory unit to an external device.

14. (original) An apparatus according to claim 1, wherein the memory unit includes an optical coupling device for transferring the information stored in the memory unit to an external device.

15. (original) An apparatus according to claim 1, wherein the sensor unit is coupled to the acquisition device using a sensor connector, the memory unit also being coupled to the sensor connector for enabling retrieval of the information stored in the memory unit using the sensor connector.

16. (original) An apparatus according to claim 1, wherein communication with the remotely-located central controller provides wireless command and control for the apparatus.

17. (original) An apparatus according to claim 1 further comprising a processor associated with the acquisition unit and the communication device, the processor processing programmed instructions enabling a software-defined radio transceiver.

18. (original) An apparatus according to claim 1, wherein the communication device includes a direct conversion radio transceiver for wireless communication between the apparatus and the remotely-located central controller.

19. (original) An apparatus according to claim 1 further comprising a processor in the acquisition unit for providing one or more of local control, time keeping, and power management.

20. (original) An apparatus according to claim 1 further comprising a power source

disposed in the acquisition device for providing electrical power to one or more of the acquisition device, the sensor unit and the communication device.

21. (original) An apparatus according to claim 20, wherein the power source is removable.
22. (original) An apparatus according to claim 20, wherein the power source includes a rechargeable battery.
23. (original) An apparatus according to claim 22 further comprising an inductive coupling in the acquisition device, the inductive coupling being operably coupled to the rechargeable battery to allow charging of the rechargeable battery by a second power source external to the acquisition device.
24. (original) An apparatus according to claim 22 further comprising a connector disposed in the data acquisition device, the connector being operably coupled to the rechargeable battery to allow charging of the rechargeable battery by a second power source external to the acquisition device.
25. (original) An apparatus according to claim 22, wherein the rechargeable battery comprises one or more of a nickel-metal hydride battery, a lithium-ion battery, and a lithium-polymer battery.
26. (previously amended) An apparatus according to claim 1, wherein the location sensor comprising a GPS receiver for determining the location parameter.

Claims 27-60 are cancelled.

61. (currently amended) A system for seismic surveying to characterize a subsurface

formation, comprising:

- a) a central controller;
- b) a sensor unit remotely located from the central controller, the sensor unit coupled to the earth for sensing seismic energy in the earth and for providing a signal indicative of the sensed seismic energy reflected from the subsurface formation;
- c) a recorder device co-located with the sensor unit and coupled thereto for receiving the signal and for storing in digital form information indicative of the received signal in a first memory disposed in the recorder device;
- d) a location sensor co-located with the recorder device providing a location parameter, the sensor unit, the recorder device and the location sensor forming a single sensor station, the location parameter being correlated with the acquired seismic data to generate a image of the subsurface formation;
- e) a second memory for storing a location parameter associated with the sensor unit; and
- f) a communication device co-located with the sensor unit and the recorder device for providing direct bi-directional communication with the central controller.

62. (original) A system according to claim 61 further comprising an energy source for providing the seismic energy in the earth.
63. (original) A system according to claim 61, wherein the communication device includes a two-way wireless transceiver for wireless communication with the central controller.

Claims 64-68 are cancelled.

69. (currently amended) A system for seismic data acquisition comprising:

- a) a central controller;
- b) a plurality of sensors disposed to form a seismic spread having a plurality of sensing locations, the seismic spread being proximate to a subsurface formation of interest and generating signals indicative of the sensed seismic energy;
- c) a plurality separate recorder co-located with each sensor recorders, each of the plurality of recorders recording seismic information corresponding to a selected sensing location from the plurality of sensing locations, each recorder of the plurality of recorders being in direct bi-directional communication with the central controller; and
- d) a location sensor associated with each recorder of the plurality of recorders providing a location parameter, the location parameter being correlated with the acquired seismic data to image the subsurface formation.

70. (currently amended) An apparatus for seismic ~~data acquisition~~ imaging of a subsurface formation, comprising:

- a) a plurality of sensors disposed to form a seismic spread having a plurality of sensing locations, the seismic spread being positioned proximate to a subsurface formation of interest to sense seismic energy imparted into the subsurface formation and generate responsive signals;
- b) a plurality of recorders, each of the plurality of recorders co-located with one sensor and recording in digital form seismic information corresponding to a selected sensing location from the plurality of sensing locations, the seismic information being in a form for seismic imaging of the subsurface formation; and
- c) a location sensor associated with each of the plurality of recorders providing a location parameter to be correlated with the acquired seismic data.

71. (currently amended) An apparatus for seismic data acquisition comprising:

- a) a sensor unit for sensing seismic energy, the sensor unit providing a signal

indicative of the sensed seismic energy, the sensor unit being positioned over a subsurface formation of interest to sense seismic energy imparted into the subsurface formation and generate signals indicative of the seismic energy sensed from one selected location;

- b) a location sensor co-located with the sensor unit providing a location parameter to be correlated with the acquired seismic data.
- c) an acquisition device co-located with the sensor unit and coupled thereto for receiving the signal and the location parameter;
- d) a memory unit disposed in the acquisition device for storing information indicative of the received signal; and
- e) a direct-conversion radio transceiver for providing communication between the acquisition device and a remotely-located central controller.